

## Vetiver for farmers: how to multiply, plant contour hedges, plug gullies

From J. Greenfields' 'The Vetiver System for Soil & Water Conservation' and 'The Vetiver System for Agriculture' by Paul Truong, Tran Tan Van, Elise Pinnars (2008).



### Vetiver and Soil and Water Conservation (SWC)

Good farm management needs a natural system of soil conservation. CIAT: 'Vetiver hedgerows are probably the best living barrier one could possibly ask for in terms of its low competitiveness with associated crops and its extremely effective erosion control'. Vetiver adapts to a range of local conditions, problematic soils, hard soil layers, and erratic rains; it generally resists pests.

In Kenya KARI tested its on-farm use and promotes it; NEMA actively promotes Vetiver propagation in Nyanza. Proper expansion of Vetiver System (VS) could be the **quickest, least costly, most effective way to address Kenya's crises related to land and water resources.**

### Added on-farm benefits

Using Vetiver on-farm is affordable and simple: 'farmer-can-do-it-her/himself'. Vetiver hedges not only retain soil moisture and fertility, but the hedges can also:

- protect crops against flood damage
- function as fire-break or wind breaks
- provide fodder (when cut fresh, every 4-6 weeks; *dry vetiver hay is indigestible*)
- make bedding for livestock; soaks up urine, staying dry
- generate income with leaves **handicraft, thatch, brooms**
- reduce pests; hedges pull Chilo stem borers away from maize, and are a harbour predator insects. Sharp leaves make that rodents and snakes can't penetrate.



### Vetiver System

As bio-engineering method it effectively assists re-

vegetation, gully control, and infrastructure protection (steep slopes, drains, and stream banks).

### Special Characteristics of Vetiver

Vetiver grass (*Chrysopogon zizanioides*) originates from southern India where farmers used VS for over 200 years.

Farmers have long since appreciated these characteristics:

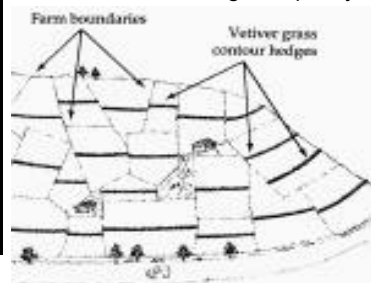
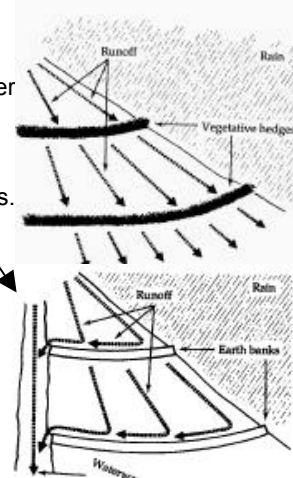
- Planted as a slim, closed hedge, the stiff stems reduce water speed, reducing soil loss and water runoff. This improves soil moisture and fertility. Soil deposited behind the hedge is naturally building a terrace.
- The strong, deeply penetrating root system grows down, not sideways; roots do not compete with crops right next to the hedge.
- The root system is unique: roots penetrate 3-4 meters, making it drought resistant.
- Established hedges resist overgrazing & fire.
- Vetiver does not easily establish under shade.
- Vetiver resists most pests, and attracts some pests (pulling Chilo stem borer away from maize) without itself being affected.



### Why Vetiver hedges are most effective

Comparing with the outdated practice of constructed stone or earth banks ('fanya juu', 'fanya chini') the advantages of Vetiver hedges are:

- **Easier to establish, multiply and maintain.**
- Even with heavy rainfall, Vetiver hedges don't break.
- Hedges *re-distribute water inside the farm* whereas constructed contours divert water: of-farm drainage problems.
- Earth banks must follow contour exactly and sharp bends near gullies will obstruct ploughing; hedges follow smoother course.
- With Vetiver hedges **crops benefit more from improved fertility, water infiltration**, and good quality mulch.



Vetiver on contour lines and boundaries requires no drainage network.

Farmers semi-arid Ethiopia used VS and measured crop yields increases of 40-50%.

### Multiplication

Established on-farm Vetiver hedges can be narrowed using a spade: remove half of each clump for planting. Gullies make good nurseries because they are often permanently moist and have good growth conditions. Vetiver planted densely in large gullies can be used for replanting elsewhere.

Stem and root cuttings grown under plastic are a cheap way of propagation. Treat cuttings with rooting medium e.g. made of water hyacinth: keep it in plastic for 2 weeks, then press the juice and make a 10% solution.

### Nurseries

- Nurseries should not have shade, and water available for irrigation (especially in very dry areas).
- Best is to plant on sandy/loamy soil for easy up-rooting. Sandy areas near permanent rivers are fine.
- Plant 25-30 cm (1ft) square to allow clumps to form. 25x30cm gives 120,000 pl/ha; leaving an alley after every 3<sup>rd</sup> row (60 cm) you 90,000 slips/ha (36,000 pl/acre). To have enough plants also to fill gaps, count 10 plants/m<sup>3</sup>.
- Prune, and treat roots with mud or 'cow tea' (slurry of cow dung & water).



### Splitting to get slips

Pull apart a clump with both hands, so that roots remain on each side. A slip has at least two viable, healthy tillers. Cut leaves to 20cm.



## Fertilization

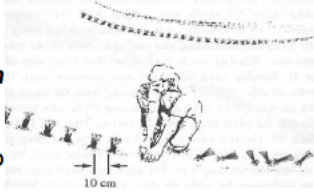
For optimum tillering, fertilize 150 kg/ha of N, or 10 g/plant NPK<sup>17:17:17</sup>. For nurseries, planting at a distance of at least 25 x 30 cm (with alleys to pass, this will come down to 900 kg/ha. You can also use DAP up to 500 kg/ha (dibble it into the planting furrows before planting. For hedges of 8 plants/m, you'll need 80 g/m or 80 kg/km.

## Field Planting

Simply plant the vetiver across slopes or across gullies or rills, look after it for a couple of seasons until it establishes, and you will have protection from erosion for life: a vegetative system of soil and moisture control that will enable you to develop a sustainable farming system.

**Very important: only closed hedges (leaving no gaps) are effective!!**

Plant distance **max. 12-15 cm** or 8 slips/m (at least 2 slips/ft. +5 inch apart). Make sure the roots are sufficiently pruned, to allow deep planting: at least 2cm of stem to be covered with soil (2cm above the roots).



## Maintenance

On a normal farm soil, planting Vetiver when the ground is wet, it can survive a long period of drought after planting. Yet, for firm root establishment it is **important to monitor the plants in the first three months**, and protect them from damage due to grazing or otherwise.

Once the Vetiver has established (1 month after planting), ploughing a small furrow immediately above the hedge helps to capture runoff, resulting in better plant growth.

**Gap filling** is essential and should be done early, at the beginning of wet season.

After 3 months (when a closed hedge is well established) maintenance is limited to pruning; to encourage tillering and hedge thickening, the grass should be cut back to 30-50 cm **after the first year** (cutting in the first year does not seem to have an incremental impact on tillering).

**If** termite infestation is a problem (mostly termites do it no harm, targeting dead leaves), use Benzene Hexa-Chloride (BHC): 1 kg /150m hedge.

## Measuring contours

You may use a line level with 5 or 10m string; put sticks at convenient eye height.



## Spacing of hedgerows

**Vertical Interval (VI):** vertical distance from one row to the next (see drawing). Normally a **2m VI** is OK.

**Surface run:** distance on the ground, depends on steepness. With a 2m VI on a 2% slope the run would be 100m, on 5% slope it would be 40m, on 10% it would be 20m, on 20% it would be 10m, and on 25% it would be 8m. As in above drawing, on a steep 57% slope the surface run is **+4m**.

**On very small farms** with scarce land (Kisii) farmers are reluctant to plant across their fields: then plant it on field

boundaries; it provides a permanent, boundary marker. **On non-arable, heavily eroded lands** vetiver should be planted first in the gullies and around gully heads; material from gullies can then be used for planting across the slopes in subsequent years. Extremely polluted or acid soils: lime up to 20 t/ha.

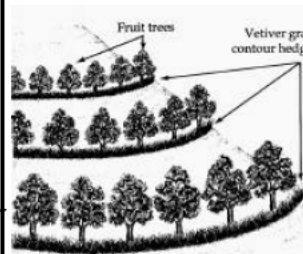
## Gully plugging

Larger gullies: use sugar-bags filled with soil, then planting Vetiver in holes in the bags. The roots can grow through a pile of 3-4 bags. With the sediment covering Vetiver stems, the stems make new roots. In gully-heads fill the bags after placing them.

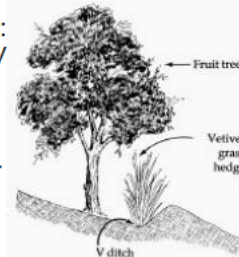
## Other Practical Uses for Vetiver grass

**Land rehabilitation:** a low cost natural method for rehab of waste land, contaminated land or degraded forest. Vetiver improves infiltration and greatly adds to organic matter build-up due to improved infiltration, soil retention, micro-climate. Other species then naturally settle in-between hedges.

**Establishing forests or tree plantations:** line trees on contours, if possible in V ditches with Vetiver hedges on borders.

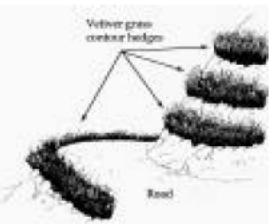


**Mulching for tea, coffee, fruit trees:** cut Vetiver down to ground level when the dry season sets in; put leaves as mulch at the tree base to store and retain moisture. The leaves last well, harbour few harmful insects, and also protect young trees in



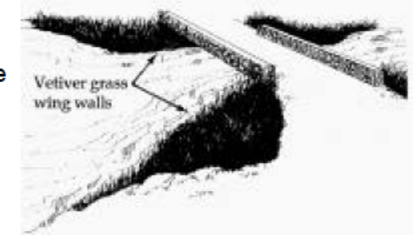
hot summer by providing some indirect shade.

**Protecting roads:** Vetiver is used to protect road sides, deal with drainage, and protect bridges. This prevents erosion for many years; it is sustainable, more effective and cheaper than other measures. For steep slopes with loose soil, use wet stick planting method...



**Protecting riverbanks, canals and dams:** to prevent siltation of dams, dikes and canals.

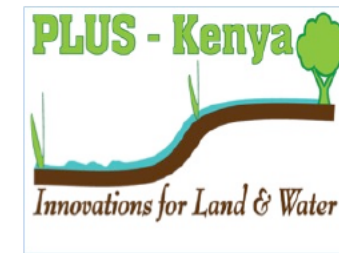
For this and larger scale infrastructure applications see [www.vetiver.org](http://www.vetiver.org) and follow Vetiver Grass Network on Facebook! Larger works should be done by TVNI certified experts.



## Vetiver System - relevance for Kenya

Climate change and unsustainable farming practice on expanding farm areas combined result in degrading land and water resources and water related health problems; we do not refer to potential disasters: this is an ongoing catastrophe unfolding before our eyes.

**Addressing degradation of land and water resources, and improving rainfall retention is imperative to avoid increasingly higher bills of the consequences of droughts and floods:** crop failures due to droughts as well as floods, destruction of houses and infrastructure due to floods and landslides, and decreasing water quality and quantity for household, agricultural and industrial use.



Version Jan 2013,  
by  
Elise Pinnors<sup>1</sup>

<sup>1</sup> Elise is Director in TVNI, [www.vetiver.org](http://www.vetiver.org) and GCC [www.greencycleconsulting.com](http://www.greencycleconsulting.com) Platform for Land Use Sustainability [www.pluskenya.org](http://www.pluskenya.org)